DETAILED ACTION

Specification

1. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

2. The following headings are required for a utility application under 37 CFR 1.77(b)

    a) title of the invention,

    b) cross-reference to related application,

    c) background of the invention,

    d) summary of the invention,

    g) **brief description of drawings,** and

    h) detailed description of the invention.

Appropriate corrections are required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gersmann et al (GB 2092172) or Bell et al (GB 2097382) in view of Janda et al (WO 02/26676 A2) and further in view of Moore et al (US 20020173556 A1).

Applicants' claimed invention is directed to a process for co-producing hydrocarbons and dimethyl ether (DME), the process including feeding a gaseous feedstock comprising hydrogen and carbon monoxide, into a three-phase low temperature catalytic Fischer-Tropsch reaction stage which includes a slurry bed of a solid particulate shifting Fischer-Tropsch catalyst suspended in a carrier liquid; allowing the hydrogen and carbon monoxide partially to react catalytically in the Fischer-Tropsch reaction stage to form hydrocarbons, at an overall CO and H_2 conversion of between 30% and 60%;obtaining a tail gas from the Fischer-Tropsch reaction stage which includes unreacted hydrogen and carbon monoxide and also carbon dioxide; adjusting the composition of at least a portion of the tail gas to provide a DME synthesis feedstock with a syngas number (SN) between 1.8 and 2.2, where SN = [H_2] - [CO_2] / [CO] + [CO_2] where [H_2], [CO] and [CO_2] respectively are the molar proportions of hydrogen, carbon monoxide and carbon dioxide in the DME synthesis feedstock;feeding the DME synthesis feedstock into a DME synthesis stage; and converting at least a portion of the DME synthesis feedstock fed to the DME synthesis stage to DME.

Gersmann teaches a process for the production of DME followed by the Fischer-Tropsch synthesis step using the tail gas of the DME production, which comprises the unreacted syngas. Furthermore, Gersmann already recognizes that the syngas mixture

suitable for the Fischer-Tropsch reaction differs from the syngas mixture useful to provide DME, i.e. for the best performance the syngas mixture should be adjusted for each step in order to provide the most suitable mixture.

The technical advantages achieved in the present application, i.e. a high conversion of syngas to the desired products, are the same as in Gersmann; cf. the examples 3, 5-8 of Gersmann and the examples of the present application.

The problem to be solved by the present invention may therefore be considered as providing an alternative process for the production of hydrocarbons and DME.

The problem has been solved by the presently claimed process of claim 1, whereby the hydrocarbon and the DME synthesis steps have been interchanged.

The mere change in the sequence of steps is generally not considered as involving an unobvious step. Both process steps, i.e. the Fischer-Tropsch and the DME synthesis step, use syngas to produce valuable compounds and unreacted syngas. Using the unreacted syngas from one step in the other step has been demonstrated in Gersmann. It would be obvious for the skilled person that the sequence of the steps could be interchanged, as long as the syngas mixture is suitable for the required step. The requirement for adjusting the syngas mixture for each of the single steps has already been acknowledged in Gersmann. The requirement of a syngas number between 1.8 and 2.2 is already known as advantageous in the production of methanol, see Janda et al, page 3, lines 21-23, page 7, line 30 - page 8, line 19, which is the first compound to be produced in the DME-synthesis. Keeping the

syngas number in the aforementioned range is therefore considered to be obvious for the skilled person.

The present claim is concerned with the co-production of hydrocarbons and dimethyl ether using a combination of a Fischer-Tropsch and a DME synthesis stage, which is exactly the same as in Gersmann and Bell. Gersmann or Bell are therefore considered to represent the closest prior art. The technical advantages are the same. Thus, the problem is the provision of an alternative process. As mentioned above changing the reaction steps is usually not considered a patentable distinction, if no surprising or unexpected effect results from this change. Such an effect is not apparent.

It has been correctly pointed out by the applicant that the steps may not merely be swapped, because the Fischer-Tropsch and the DME synthesis stage may require different proportions of CO, H_2 and CO_2. However, this is known to the skilled person. Both reactions are well known in the art, and so is the necessity to use the best proportions of CO, H_2 and CO_2 for each step. This has also been acknowledged in Gersmann. The skilled person does not need inventive skills to adjust the CO, H_2 and CO_2 proportion, if this would be required by changing the reaction steps. Claim '1 is therefore not considered to meet the requirement under 35 U.S.C. 103 (a).

The subject-matter of the dependent claims 2-17, is also not considered to meet the requirement under 35 U.S.C. 103 (a) for the following reasons:

The features mentioned in the dependent claims are either obvious for the skilled person (for example if a certain amount of carbon monoxide, hydrogen and carbon

dioxide is known to be required, it would be obvious for the skilled person to remove or add individual components in order to adjust a mixture in such a way as to achieve the required amount) or generally known in the area (for example the recycling of streams, or the upgrading of Fischer-Tropsch reaction products, or the use of naphtha as feedstock for the production of light olefins, see Moore et al., abstract and paragraphs 0065 and 0047.

The additional feature of treating the liquid hydrocarbons to provide a liquid fuel, which includes for example hydroprocessing steps or dewaxing steps, is well known in the art, see for example Moore et al paragraph 0047. Naphtha is known to be an ideal feedstock for cracking to olefins (see Ullmann's Encyclopedia of industrial chemistry, vol. 8, 2003, pages 651-668) therefore, such steps are not considered to meet the requirement under 35 U.S.C. 103 (a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jafar Parsa whose telephone number is (571)272-0643. The examiner can normally be reached on 9 a.m.-5:30 p.m. (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Sullivan can be reached on 571-272-0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jafar Parsa/
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